



Course Specifications

Course Title:	Complex Analysis
Course Code:	MTH 482
Program:	BS-Mathematics
Department:	Mathematics
College:	College of Sciences, AlZulfi
Institution:	Majmaah University, Saudi Arabia

Table of Contents

A. Course Identification	3
6. Mode of Instruction (mark all that apply)	3
B. Course Objectives and Learning Outcomes	3
3. Course Learning Outcomes	4
C. Course Content	4
D. Teaching and Assessment	5
1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods	5
2. Assessment Tasks for Students	5
E. Student Academic Counseling and Support	6
F. Learning Resources and Facilities	6
1. Learning Resources	6
2. Facilities Required.....	6
G. Course Quality Evaluation	7
H. Specification Approval Data	7

A. Course Identification

1. Credit hours: 4(3+1)
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 7 th Semester /4 th year
4. Pre-requisites for this course (if any): MTH 381& MTH 203
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	75%
2	Blended	0	0%
3	E-learning	0	0%
4	Distance learning	0	0%
5	Other	15	25%

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	45
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	15
	Total	60

B. Course Objectives and Learning Outcomes

1. Course Description:

Complex numbers and their properties – exponential, logarithmic, trigonometric, and hyperbolic complex functions-

Limit and continuity of a complex function- derivatives- Cauchy –Riemann equations – analytic functions- Harmonic functions -

Contours- Cauchy- Goursat Theorem- Cauchy integral formula- Derivatives of analytic functions- Taylor series- Laurant series- Power series- Zeros- Singularities-Residue Theorem- Applications.

2. Course Main Objectives:

- 1) Studying the main properties of complex numbers.
- 2) Studying the main properties of exponential, logarithmic, trigonometric and hyperbolic functions.

- 3) knowing the limit of a complex function – continuity and differentiability of a complex function- Cauchy –Riemann equations- analytic functions – Harmonic functions.
- 4) Having the knowledge of complex integral on a path.
- 5) Studying Cauchy integral formula.
- 6) Studying pole of a complex function, Laurent series and Residue theorem.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Reproduce fundamentals and concepts of of complex numbers and its properties- exponential, logarithmic, trigonometric, and hyperbolic functions.	K1
1.2	Reproduce fundamentals and concepts of the limit and continuity of a complex function- derivatives.	K1
1.3	Construct mathematical arguments and proofs and apply the underlying structures of Cauchy –Riemann equations – analytic functions- Harmonic functions.	K4
1...		
2	Skills :	
2.1	Communicate Mathematical ideas for Taylor series- Laurant series- Power series- Zeros- Singularities-Residue Theorem- Applications.	S1
2.2		
2.3		
2...		
3	Values:	
3.1	Ability to work in a team to understand the problem.	C1
3.2		
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Complex numbers and their properties – exponential, logarithmic, trigonometric, and hyperbolic complex functions	16
2	Limit and continuity of a complex function- derivatives- Cauchy –Riemann equations – analytic functions- Harmonic functions.	12
3	Contours- Cauchy- Goursat Theorem- Cauchy integral formula.	8
4	Derivatives of analytic functions.	8

5	Taylor series- Laurant series- Power series- Zeros- Singularities-Residue Theorem- Applications.	16
Total		60

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	Complex Numbers What is the complex numbers and their properties?	<ul style="list-style-type: none"> Lectures/Presentations Media Lectures Tutorials 	<ul style="list-style-type: none"> Exam Assignment Quiz Final Exam
1.2	Limit & Continuity & Derivatives What is the limit, continuity, and derivatives? How to evaluate the limit, continuity, and derivatives?	<ul style="list-style-type: none"> Lectures/Presentations Media Lectures Tutorials 	<ul style="list-style-type: none"> Exam Assignment Quiz Final Exam
1.3	Analytic & Harmonic What is analytic and harmonic function?	<ul style="list-style-type: none"> Lectures/Presentations Media Lectures Tutorials 	<ul style="list-style-type: none"> Exam Assignment Quiz Final Exam
2.0	Skills		
2.1	Solve the Cauchy integral equation.	<ul style="list-style-type: none"> Lectures/Presentations Media Lectures Tutorials 	<ul style="list-style-type: none"> Exam Assignment Quiz Final Exam
2.2	Understand the concept of Cauchy –Riemann equations.	<ul style="list-style-type: none"> Lectures/Presentations Media Lectures Tutorials 	<ul style="list-style-type: none"> Exam Assignment Quiz Final Exam
2.3	Understanding of Zeros-Singularities-Residue Theorem.	<ul style="list-style-type: none"> Lectures/Presentations Media Lectures Tutorials 	<ul style="list-style-type: none"> Exam Assignment Quiz Final Exam
3.0	Values		
3.1	Ability to work in a team to understand the problem	<ul style="list-style-type: none"> Group discussion 	<ul style="list-style-type: none"> Exercise Electronic MCQ Test
3.2			
...			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	4 th Week	5%
2	Assignment/Home Work 1	5 th Week	2.5%
3	Mid Term 1	7 th Week	15%
4	Quiz 2	9 th Week	5%
5	Assignment /Home Work 2	10 th Week	2.5%
6	Class Activities/Discussions	12 th Week	5%
7	Mid Term 2	13 th Week	15%

#	Assessment task*	Week Due	Percentage of Total Assessment Score
8	Electronic Test	14 th Week	10%
9	Final Exam	---	40%
	Total		100%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

Department of mathematics has “Student Academic Advisory Committee”. This committee is responsible for students counseling and advising works in synchronization and collaboration with the Deanship of Admissions and Registration and Student Affairs. Department of mathematics Alzulfi has a continuous and standardized procedure that be associated with the student's progress until completion of degree and includes psychological, social, and behavioral guidance. This advisory committee also maintain the student's files. The students with GPA below than 50 % in Mid1 and Mid 2 are stayed under serious observation and continuous consultations with respective course instructor about their performing. The course teacher will commit to a minimum scheduled time for student consultation equivalent to 2 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<ol style="list-style-type: none"> 1. James Ward Brown and Ruel V. Churchill, Complex Variables with Applications, McGraw Hill, Inc., 2009 (8th Edition). 2. John B. Conway, Functions of one complex variable, Springer-Verlag, 2002.
Essential References Materials	Dennis G. Zill and Patrick D. Shahann, A first course in complex analysis with applications, Advanced Engineering Mathematics (2 nd edition), John and Barlett Publishers .ISBN 073714372
Electronic Materials	MIT Open Courses Khanacadmy
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> - The size of the room should be proportional to the number of students - Provide enough seats for students. - The number of students do not exceed on 30 in the classroom

Item	Resources
Technology Resources (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> - Mathematics Lab is equipped with a computer. - Provide overhead projectors and related items i.e smart Board, Wi-Fi, AV. - Updated Math Software i. e Mathematica, Matlab, Maple. etc
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students/ internal committee	Direct (Students evaluation electronically organized by Deanship of registration and admission)/ Verification of students' papers
Extent of achievement of course learning outcomes	Staff members (Peer Reviewer)	Indirect (Frequent meetings consultation among the teaching staffs)
Quality of learning resources.	Staff members (course coordinators)	Direct (Meeting between course coordinators and the tutors)

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Mathematics Department
Reference No.	27
Date	8/8/1442 H -21/3/2021 G

Head of Department

Dr. Muqrin Almuqrin


